

Title: Recycling waste noise monitoring

Date of Survey: 1st to the 9th of August 2019

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1. Executive summary

This report has been compiled to support North Tyneside Council's commitment to comply with the 'Control of noise at work regulations 2005'. Four different waste collection rounds were assessed to give a good understanding of the current noise levels that are associated with this job role. Per round, two operatives wore a shoulder attached dosimeter and upon analysis of the results, 6 out of the 7 results are in breach of the 87dB(A) weighted sound exposure limit.

To reduce the noise levels which are being created within this role, the hierarchy of control should be implemented following the detailed suggestions included within this report, for example adding flaps/brushes to slave bins to reduce the speed of glass as it enters the slave bin and reduce impact noise adding. The use of Personal protective equipment (PPE) should be a last resort and all other control measures should be considered before PPE.

The use of hearing protection must be provided and enforced upon the collection of these results. The noise protection that staff are using at present have an SNR value of 35dB. This is overprotection as this will block too much sound from the workers ears. Using octave band analysis, a SNR value of 20 would offer enough protection however still allow the worker to hear sound in their working environment.

2. Introduction

A noise assessment was requested to be undertaken by the Health and Safety Team following advice from Karl Lowthian (Senior Health and Safety Manager) in December 2018. High noise levels of Kerbside collection is a known issue within the Waste and Recycling industry, particularly in relation to glass collection and was an issue that was raised by the workforce when Karl was providing advice with different matters at the time. The previous noise survey was undertaken in December 2015.

The assessment was conducted over 4 days with the first day being 01.08.2019 and 09.08.2019 was the last. Each day involved monitoring two operatives through use of Dosimeters (personal noise exposure meters attached to the employees shoulder) for their working day and observations made of the premises and activities to provide a representative assessment of noise levels and personal exposure.

The recycling rounds were targeted for the Noise Survey as the recycling bins have a caddy that is specifically for collecting glass. The noise levels in recycling will be higher than General Household waste collection as glass on glass contact will produce higher sound levels.

Results and observations made during the assessment have been presented within this assessment and inform the recommendations, including the most suitable type of hearing protection through 3rd octave band analysis.

The assessment was arranged and conducted Jay Tait. This included discussions with employees and management to gain an understanding of the activities within the role of a waste collector and what daily tasks they perform.

I would like to extend my thanks to the team for the open, honest and detailed information provided to me during the assessments and the hospitality extended to myself during the assessments.

On arrival before we left the depot, the crew members wearing the dosimeters received a 5-minute toolbox talk so the crew had an understanding what the device was, the purpose of the assessment and therefore gave the crew an opportunity to ask myself any questions and raise any relevant concerns that they may have had. The reception on a whole was good as staff embraced the assessments.

3. Assessment Methodology

Two Personal sound exposure meters (dosimeters) were selected and utilized as the most effective means of monitoring noise exposure owing to the mobile nature of operators.

Additionally, an SLM (Sound Level Meter) was used for static noise assessments when calculating background noise.

The SLM and dosimeters were calibrated prior to and on completion of the assessment.

Equipment	Calibration Date	Serial Number
Cirrus CR:120A Dosimeters	8 th January 2019	MK501175
Cirrus CR:120A Dosimeters	8 th January 2019	MK501114
Calibrator Dosimeter 114 dB	8 th January 2019	86319
Handheld Sound Level Meter (SLM)	8 th January 2019	G081040
Calibrator (SLM) 94 dB	8 th January 2019	86894

Both operators were instructed on how the equipment was to be used and fitted. The dosimeters were fastened to the shoulder of each operator and activated at the start of the working day.

Glossary of Terms

- LAeq** Equivalent continuous sound level, and represents the total sound exposure for the period of interest or an energy average noise level for the period of interest
- LEPd** Daily Personal Noise Exposure
- Dose %** The noise exposure expressed as a percentage (%) of a fixed level for 8 hours.
- LAF** Fast, A-Weighted Sound Level
- LCEq** The equivalent continuous sound level, and represents the total sound exposure for the period of interest or an energy average noise level for the period of interest (C weighted)
- DB(A)** 'A' Weighting is a standard weighting of the audible frequencies designed to reflect the response of the human ear to noise. The 'A' Frequency Weighting

network is the most widely used and is used to represent the response of the human ear to loudness.

DB(C) 'C' weighting gives much more emphasis to low frequency sounds than the 'A' weighting response and is essentially flat or linear between 31,5Hz and 8kHz, the two -3dB or 'half power' points. In addition, Peak Sound Pressure measurements are made using the 'C' Frequency Weighting.

4. Results of Assessment

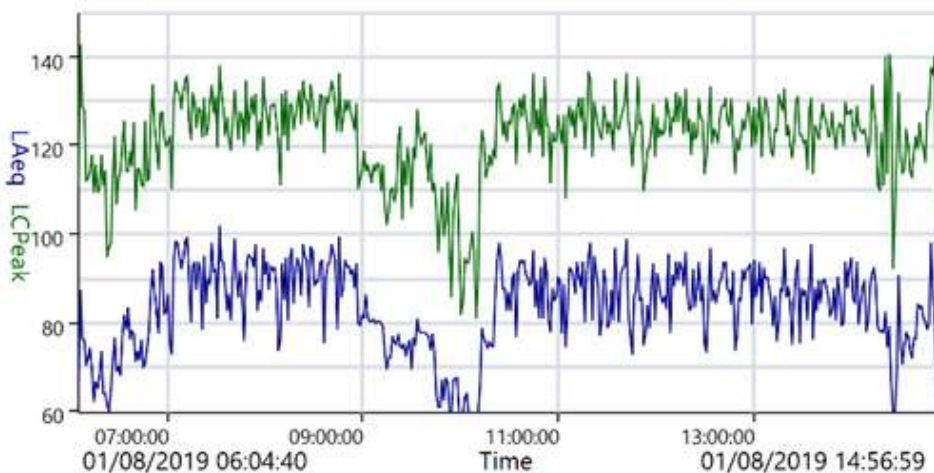
4.1 Typical Activities

- Driver to complete vehicle checklist and ensure there is no damage prior to use.
- Collecting domestic household bins
- Placing bins onto the waste vehicle and allowing to empty.
- Once empty, placing the bin back onto the resident's property.
- Emptying the glass from the caddy into the glass slave bin.
- Emptying the glass slave bin when it becomes full

First Assessment Date 1st August 2019

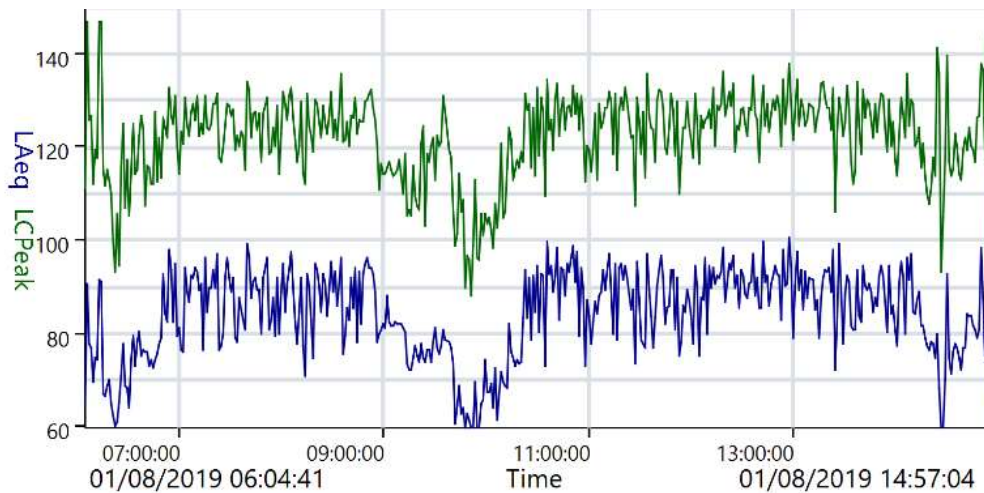
Operator 1

Peak & Max Values		ISO LAeq		ISO LCeq	
LCPeak	142.5 dB	LAeq	90.0 dB	LCeq	93.2 dB
LAFMax	123.4 dB	LEPd	90.5 dB		
LAFMaxTime	---	Dose	350.7 %		
		LAE	135.0 dB		



Operator 2

Peak & Max Values		ISO LAeq		ISO LCeq	
LCPeak	146.9 dB	LAeq	90.4 dB	LCeq 94.3 dB	
LAFMax	124.5 dB	LEPd	90.9 dB		
LAFMaxTime	---	Dose	384.6 %		
		LAE	135.4 dB		



For the above graph, we can see the levels of noise through the line graphs. This can give a visual representation of break times, work times and when the noise was at its highest.

Second Assessment Date 6st August 2019

Operator 1

Peak & Max Values		ISO LAeq		ISO LCeq	
LCPeak	142.6 dB	LAeq	86.7 dB	LCeq 91.7 dB	
LAFMax	123.9 dB	LEPd	87.7 dB		
LAFMaxTime	---	Dose	184.6 %		
		LAE	132.3 dB		

Operator 2

N.B. The dosimeter was temporarily stopped for approximate 15 seconds. Therefore there are two separate readings for each period of noise measurement.

Peak & Max Values		ISO LAeq		ISO LCeq	
LCPeak	146.8 dB	LAeq	88.2 dB	LCeq	91.5 dB
LAFMax	121.7 dB	LEPd	85.7 dB		
LAFMaxTime	---	Dose	117.9 %		
		LAE	130.3 dB		

Peak & Max Values		ISO LAeq		ISO LCeq	
LCPeak	146.9 dB	LAeq	81.7 dB	LCeq	92.6 dB
LAFMax	124.0 dB	LEPd	80.0 dB		
LAFMaxTime	---	Dose	31.8 %		
		LAE	124.6 dB		

Third Assessment Date 6st August 2019

Operator 1

Peak & Max Values		ISO LAeq		ISO LCeq	
LCPeak	147.0 dB	LAeq	83.6 dB	LCeq	92.7 dB
LAFMax	120.6 dB	LEPd	83.7 dB		
LAFMaxTime	---	Dose	74.8 %		
		LAE	128.3 dB		

Operator 2

Peak & Max Values		ISO LAeq		ISO LCeq	
LCPeak	143.5 dB	LAeq	90.1 dB	LCeq	94.5 dB
LAFMax	122.9 dB	LEPd	90.2 dB		
LAFMaxTime	---	Dose	334.3 %		
		LAE	134.8 dB		

Fourth Assessment Date 6st August 2019

N.B. The weather on this date was severe with heavy rain for the entire assessment. To protect the equipment, the workers were asked to put the dosimeter underneath their waterproof coats. Therefore, this may have had an effect on the results and would have lowered the noise readings slightly.

Operator 1

Peak & Max Values		ISO LAeq		ISO LCeq	
LCPeak	147.0 dB	LAeq	87.4 dB	LCeq	92.3 dB
LAFMax	118.3 dB	LEPd	85.7 dB		
LAFMaxTime	---	Dose	118.7 %		
		LAE	130.3 dB		

Operator 2

Peak & Max Values		ISO LAeq		ISO LCeq	
LCPeak	147.8 dB	LAeq	89.3 dB	LCeq	100.0 dB
LAFMax	121.7 dB	LEPd	87.6 dB		
LAFMaxTime	---	Dose	183.8 %		
		LAE	132.2 dB		

Summary of Results

Depot	Dosi meter ID	Date	LAeq	LEPd	Dose %	LC peak	LAF max	LCeq	Start time	Finish time (including 30 min break)	Comments
Killingworth	114	9/08/2019	89.3	87.6	183.763	147.8	121.7	100.0	06:30	Crew 11:30 Driver 13:00	
Killingworth	175	9/08/2019	87.4	85.7	118.695	147.0	118.3	92.3	06:30	Crew 11:30 Driver 13:00	
Killingworth	114	8/08/2019	90.1	90.2	334.335	143.5	122.9	94.5	06:30	14:50	
Killingworth	175	8/08/2019	83.6	83.7	74.806	147.0	120.6	92.7	06:30	14:50	Device was not worn for a period of 25 minutes
Killingworth	114	6/08/2019	86.7	87.7	184.606	142.6	123.9	91.7	06:30	14:30	Vehicle broken down from 11:30 till 13:00 and other crews completed the majority of the round.
Norham	175	1/08/2019	90.4	90.8	384.577	146.9	124.5	94.3	06:30	14:30	
Norham	114	1/08/2019	90.0	90.4	350.694	142.5	123.4	93.2	06:30	14:30	

Key

- **Red** represents noise levels that are above Exposure Limit Value
- **Amber** represents noise levels that are above the Upper Exposure Action value
- **Green** represents noise levels that are above the Lower Exposure Action value

5. Interpretation of Results

Legislation - Control of Noise at Work Regulations 2005

Lower Exposure Values	Upper Exposure Values	Exposure Limit Values	Highest dB recorded (LEPd)
A daily or weekly personal noise exposure of 80 dB (A-weighted)	A daily or weekly personal noise exposure of 85 dB (A-weighted)	A daily or weekly personal noise exposure of 87 dB (A-weighted)	90.8 Db(A)
A peak sound pressure of 135 dB (C-weighted)	A peak sound pressure of 137 dB (C-weighted).	A peak sound pressure of 140 dB (C-weighted).	147.8 Db (C)
Hearing protection (not mandatory) The employer has to provide information and training and make hearing protection available free of charge.	Hearing protection (mandatory) The employer is required to take reasonably practicable measures to reduce noise exposure, such as engineering controls or other technical measures. The use of hearing protection is also mandatory if the noise cannot be controlled by these measures.	Hearing protection (mandatory) Workers must not be exposed to noise levels above the ELV (taking hearing protection into account)	

5.1 Every assessment conducted exceeded the Exposure Limit Value for peak sound levels (140 dB(C))

5.2 Every assessment conducted exceeded the Exposure Limit Value for Daily Personal Exposure levels (87 dB(A)) with the exception of one result

5.3 The one result that did not breach the Exposure Limit Value was on the 8th of August at Killingworth using the device ID 175. The device was taken off from the operator and kept in the vehicle cab for a period of approximately 25 minutes. This is likely to be the reason why the device registered a lower reading compared to the other results.

6. Recommendations

Glass-only collection causes significantly higher noise exposures than co-mingled collection. It is likely that changing from glass-only to multi-material collection will reduce noise exposure for employees. If this is not reasonably practicable, the below hierarchy of control should be considered to reduce noise exposure levels. It is worth noting that some control measures highlighted may already be in place.

6.1 Engineering Controls

Consideration must be given to controlling noise including the modification of the process as a means of reducing noise emissions from glass-on-glass impact noise in particular. Lining (e.g. with rubber) and adding flaps/brushes to slave bins to reduce the speed of glass as it enters the slave bin and reduce impact noise.

6.2 Work Patterns

Rotate Workers on glass collection / slave bin tipping – Could the workers be rotated so that they work on different waste collections. For example, a worker may work one week on the recycling rounds, and then work the following week on domestic waste and continue this rotation.

Breaks in a quiet environment – For when the workers take their break, can this be taken in a quiet environment. For example, if the crew were to take their break within the wagon cab, make sure the engine is switched off and the radio is quiet. This will reduce the workers average noise exposure across the working day.

6.3 Working Methods

The working method adopted by employees can affect noise exposure. Depositing of glass to the slave bins can be done in a fast manner or more controlled manner e.g. a slower tipping speed. Fast depositing produces generally higher noise levels than slow depositing. Employees should be trained to avoid fast depositing methods wherever possible and ensure that this method is being followed through supervision/inspections.

6.4 Health Surveillance

Waste Collectors working within recycling collection are likely to be exposed to noise above the upper exposure action value and therefore need to be placed on a health surveillance programme.

6.5 Training

Provide information, instruction and training regarding the risks to health and the control measures in place to protect them including likely noise levels, hearing protection available and how to obtain, maintain and use it.

6.6 Signage / Zoning

As it is likely that the upper exposure action level will be exceeded, the recycling vehicle rear working area should be designated as a hearing protection zone with the appropriate signage prominently displayed.

6.7 PPE

At current recorded noise levels, hearing protection must be provided and worn at all times by recycling collectors when working within the hearing protection zone. Hearing protection may be removed when not working within noisy environments e.g. at depot or travelling to the transfer station.

6.8 What is SNR?

SNR is a Single Number Rating system. The SNR value can be used to compare the level of noise attenuation offered by different hearing protection. To determine acoustic pressure on your ears, you subtract the SNR value from the average noise level measured. For example: The noise level measures an average of 95 dB(A). You are wearing ear protection with an SNR of 20. Thus, the acoustic pressure on your ears is on average $95 - 20 = 75$ dB(A). However you must always add a further 4dB(A) to allow for real world factors. Therefore the Noise level would be 79dB(A). The higher the SNR, the higher the level of noise attenuation provided by the hearing protection.

Based on the findings of this investigation, the recommended protectors are those which have an **SNR value between 14dB and 20dB**. This is because the current hearing protection does not provide a suitable level of protection, it is recommended that management consult and considerations are made for the implementation with the collection teams to trial the below suggested hearing protection. This will allow the employees to decide which they find is best, but also protecting their hearing at the same time. PPE is only effective for the user themselves therefore it is recommended that other control measures (Points 6.1 – 6.6) are considered first to reduce the noise levels at source.

3rd octave band analysis was undertaken to review and aid the identification of the most appropriate hearing protection which reduces noise levels below the action levels but not significantly enough to affect the ability to communicate with colleagues or to hear hazards such as reversing alarms, etc. Results and analysis against the programme have identified the following recommendations for hearing protection:

Manufacturer	Name	Assumed dB (A)	Type	British standard	Reusable / disposable
Arco	egard Banded Ear Plug	70.0	Insert	EN 352-2	Banded Earplug
3M	EAR Ultrafit20 Ear plugs Corded	71.5	Insert	EN 352-2	Reusable Earplugs
3M	EAR UltraFit14 Ear Plugs - Corded	76.6	Insert	EN 352-2	Reusable Earplugs
Arco	egard Banded Ear Plug	70.0	Insert	EN 352-2	Banded Earplug

7. Conclusion

All employees who are working within North Tyneside's recycling Waste teams (with exception to the driver within the cab) are provided with, and must wear, hearing protection in order to comply with The Control of Noise Regulations 2005. Although one of the main aims of this assessment was to ensure that the noise protection provided, was suitable and sufficient in terms of providing adequate noise protection for staff and the use of octave band analysis will tell us what hearing protection is best suited for their work environment, as over protecting can introduce further hazards. The average LEPd (Daily Personal Noise Exposure) result for all sampled collections was 88db(A) and the highest value being 90.8dB(A). The average result of C weighted peak was 145dB(C). As it stands, Waste Collectors may be exposed to 300%+ of daily dose of noise. Consideration of the recommended control measures listed in Section 5 and implementation where reasonably practicable. This is as collective Control measures are unlikely to eliminate the hazard therefore it must be ensured that hearing protection being worn is mandatory and enforced e.g. through regular toolbox talks and manager inspections.

